CLAIMS

1. A hammer drill comprising:

a bit;

a housing;

a piston member disposed rear of the bit for making reciprocating motion;

a motor capable of rotation;

an intermediate shaft capable of being rotated by the rotation of the motor transmitted thereto;

a rotation mechanism for transmitting rotation of the motor to rotate the bit;

a conversion mechanism for converting the rotation of the intermediate shaft into reciprocating motion of the piston member;

a striking mechanism including a striker interlocked with the piston member for causing the striker to deliver hammer blows to the bit;

a switch member for selectively preventing the rotation of the motor from being transmitted to the conversion mechanism, the switch member being operable from outside of the housing to select one of at least two operating modes, a drill mode, in which only the rotation of the motor is transmitted to the bit, and a hammer drill mode, in which the rotation of the motor and the hammer blows are transmitted to the bit; and

a lock mechanism interlocked with the switch member such that the lock mechanism can prohibit the reciprocating motion of the piston member only in the drill mode.

2. A hammer drill in accordance with claim 1 further comprising a clutch slidably mounted on and integrally rotatable with the intermediate shaft;

wherein the conversion mechanism includes a sleeve member mounted on the intermediate shaft and capable of integral rotation with the intermediate shaft;

the switch member is adapted to slide the clutch into connection with the sleeve member; and

the lock mechanism includes:

a lock plate mounted on the sleeve member between the clutch and the sleeve member, the lock plate being capable of integral rotation with the sleeve member and axial slide with respect to the sleeve member;

biasing means for biasing the lock plate toward the clutch; and

a stopper secured within the housing for engaging the lock plate when the lock plate slides to the stopper upon disconnection of the clutch from the sleeve member.

3. A hammer drill in accordance with claim 2, wherein the sleeve member

includes at least one claw,

the lock plate has an annular shape including at least one protrusion which is provided on an inner edge thereof and which remains in engagement with the at least one claw of the sleeve member regardless of the slide position of the clutch, and

the lock plate further includes at least one recess provided in an outer edge thereof and capable of engaging a projection provided on the stopper following the disconnection of the clutch from the sleeve member, thus preventing the lock plate and thus the sleeve member from rotation.

4. A hammer drill in accordance with claim 3, wherein when the clutch is slid forward and away from the sleeve member, the biasing force of the biasing means slides the lock plate forward so as to engage one of the recesses of the lock plate with the projection of the stopper while maintaining the engagement between the at least one protrusion of the lock plate and the at least one claw of the sleeve member.

5. A hammer drill in accordance with claim 2, wherein when the clutch is slid forward and away from the sleeve member, the biasing force of the biasing means slides the lock plate forward into engagement with the stopper while maintaining the engagement between the lock plate and the sleeve member.

6. A hammer drill in accordance with claim 2, wherein the biasing means is a coil spring interposed between the lock plate and the sleeve member, and the conversion mechanism further includes a swash bearing with a connecting rod coupled to the piston member and capable of imparting reciprocating motion to the piston member.

7. A hammer drill in accordance with claim 2, wherein the clutch, the lock plate, the biasing means, and the sleeve member are coaxially arranged on the intermediate shaft with the clutch located forward of the sleeve member.

8. A hammer drill in accordance with claim 2, wherein the lock plate remains in engagement with the sleeve member regardless of the slide position of the clutch;

in the drill mode, the stopper interferes with and prevents the rotation of the lock plate while engaging the lock plate; and

when the clutch is slid into connection with the sleeve member by the operation of the switch member, the lock plate is slid and disengaged by the clutch from the stopper so as to allow integral rotation of the lock plate with the sleeve member.

9. A hammer drill in accordance with claim 1 further comprising a clutch

slidably mounted on and integrally rotatable with the intermediate shaft;

wherein the conversion mechanism includes a sleeve member mounted on the intermediate shaft and capable of integral rotation with the intermediate shaft;

the switch member is adapted to slide the clutch into connection with the sleeve member; and

the lock mechanism includes

a lock member provided on a portion of the sleeve member adjacent to the clutch and integrally rotatable with the sleeve member and

an engaging member provided on the switch member and, in the drill mode, located in a position where the engaging member engages the lock member.

10. A hammer drill in accordance with claim 9, wherein the lock member includes

a reduced diameter section mounted on a forward portion of the sleeve member and

a cylindrical large diameter section provided between the reduced diameter section and the clutch and extending forward from the reduced diameter section , the large diameter section including an outer peripheral surface and a plurality of axial grooves provided in the outer peripheral surface; and the large diameter section further being configured to receive the clutch therein; and

the engaging member includes

an elongated portion extending rearward from the switch member along the outer peripheral surface of the large diameter section and

an engaging tip provided at a rear end of the elongated portion and bent toward the lock member for engaging one of the axial grooves in the drill mode so as to prevent the rotation of the lock member.

11. A hammer drill in accordance with claim 10, wherein the switch member is slidable at least between a forward position, corresponding to the drill mode, in which the engaging tip engages one of the axial grooves and a rear position, corresponding to the hammer drill mode, in which the engaging tip is located rear of the axial grooves, thus not engaging any of the axial grooves.

12. A hammer drill in accordance with claim 10, wherein an axial length of the elongated portion is set such that the engaging tip engages one of the axial grooves of the lock member only when the switch member is in the forward position and the engaging tip is located rear of the large diameter section, when the switch member is in the rear position.

13. A hammer drill in accordance with claim 1, wherein the lock mechanism is a limiting member provided integrally with the switch member and capable of being

positioned within a range of the reciprocating motion of the piston member in the drill mode for interfering with the piston member and limiting the reciprocating motion of the piston member.

14. A hammer drill in accordance with claim 13, wherein the piston member has a center axis along which the piston member reciprocates between a first position and a second position rear of the first position, and

the limiting member includes a forward portion extending rearward from the switch member and a rear end portion coupled to a rear end of the forward portion and bent toward the center axis of the piston member, the rear end portion being positioned forward of the second position of the piston member in the drill mode.

15. A hammer drill in accordance with claim 14, wherein the switch member is slidable at least between a forward position, corresponding to the drill mode, in which the rear end portion of the limiting member is positioned forward of the second position of the piston member, and a rear position, corresponding to the hammer drill mode, in which the rear end portion of the limiting member is positioned rear of the range of the reciprocating motion of the piston member, permitting the piston member to reciprocate between the first and second positions thereof.

16. A hammer drill in accordance with claim 14, wherein the forward portion of the limiting member extends in parallel with the center axis of the piston member and the rear end portion of the limiting member extends perpendicularly from a rear end of the forward portion.

17. A hammer drill in accordance with claim 14, wherein the forward portion of the limiting member extends in parallel with the center axis of the piston member, and the rear end portion of the limiting member extends from a rear end of the forward portion and is bent perpendicularly three times.

18. A hammer drill in accordance with claim 2 further comprising a second biasing means mounted around the intermediate member for biasing the switch member toward the clutch, causing the clutch to engage the sleeve member in the hammer drill mode.

19. A hammer drill in accordance with claim 9 further comprising a second biasing means mounted around the intermediate member for biasing the switch member toward the clutch, causing the clutch to engage the sleeve member in the hammer drill mode.

20. A hammer drill in accordance with claim 13 further comprising a clutch slidably mounted on and integrally rotatable with the intermediate shaft;

a pin secured within the housing and penetrating the switch member; and

a second biasing means mounted around the pin between the switch member and a free end of the pin for biasing the switch member toward the clutch, causing the clutch to engage the sleeve member in the hammer drill mode.